

# CSC236 fall 2016

correct after & before

Danny Heap

heap@cs.toronto.edu / BA4270 (behind elevators)

<http://www.cdf.toronto.edu/~heap/236/F12/>  
416-978-5899

Using Introduction to the Theory of Computation,  
Chapter 2



# Outline

power

notes



# integer power

```
def power(x, y) :  
    z = 1  
    m = 0  
    while m < y :  
        z = z * x  
        m = m + 1  
    return z
```

- ▶ precondition?
- ▶ postcondition?
- ▶ notation for mutation



# partial correctness

precondition+execution+termination imply postcondition

a loop invariant helps get us closer



# partial correctness

precondition+execution+termination imply postcondition

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prove partial correctness

# prove termination

associate a decreasing sequence in  $\mathbb{N}$  with loop iterations

it helps to add claims to the loop invariant



put it together — correctness



# correctness by design

draw pictures of before, during, after

pre:  $A$  sorted, comparable with  $x$

post:  $0 \leq p \leq n$  and  $A[0..p-1] < x \leq A[p..n-1]$



“derive” conditions from pictures

do we have termination?

notes